WHAT IS CLAIMED IS:

1. A method of sequentially mounting, on a printed-wiring board supported by a board supporting device, a plurality of electric components which are sucked and held by respective ends of a plurality of suction nozzles which are supported by a rotatable body such that the suction nozzles are provided along a circle whose center is located on an axis line of the rotatable body and such that each of the suction nozzles is not rotatable relative to the rotatable body and is movable relative to the body in a direction parallel to the axis line of the body, the rotatable body being attached to a movable member which is movable to an arbitrary position on a movement plane parallel to the printed-wiring board supported by the board supporting device, such that the rotatable body is rotatable about the axis line thereof perpendicular to the movement plane, the method comprising the steps of:

sequentially positioning, owing to combination of the rotation of the rotatable body and the movement of the movable member, the respective electric components sucked and held by the suction nozzles, at respective positions opposed to respective predetermined locations on the printed-wiring board supported by the board supporting device, such that at least two of the electric components thus positioned take different rotation positions,

rotating, concurrently with the rotation of the rotatable body, an engaging member common to the plurality of suction nozzles, to a position corresponding to one of the suction nozzles that holds the electric component to be mounted next, and

moving, in said direction parallel to the axis line of the rotatable body, the engaging member to engage said one suction nozzle, so that said one suction nozzle is moved toward the board supporting device and the electric component held by said one suction nozzle is mounted on the printed-wiring board.

2. A method according to claim 1, further comprising:

simultaneously taking, with an image taking device, respective images of the electric components held by the suction nozzles,

processing the taken image of the electric component held by each of the suction nozzles, to determine at least one position error of the electric component held by said each suction nozzle, and

controlling the rotation of the rotatable body and the movement of the movable member to eliminate said position error.

3. A method according to claim 2, wherein the step of taking the respective images of the electric

components comprises taking, during a movement of the rotatable body caused by the movement of the movable member, the respective images of the electric components, with the image taking device which is being moved with the rotatable body.

4. An electric-component mounting system, comprising:

a board supporting device which supports a printed-wiring board;

a movable member which is movable to an arbitrary position on a movement plane parallel to the printed-wiring board supported by the board supporting device;

a main moving device which moves the movable member;

a rotatable body which is attached to the movable member such that the rotatable body is rotatable about an axis line thereof perpendicular to the movement plane;

a rotatable-body rotating device which rotates the rotatable body about the axis line thereof;

a plurality of suction nozzles which sucks and holds respective electric components and which are supported by the rotatable body such that the suction nozzles are provided along a circle whose center is located on the axis line of the rotatable body and such that each of the suction nozzles is not rotatable relative to the rotatable body and

is movable relative to the body in a direction parallel to the axis line of the body;

an engaging member which is rotatable relative to the rotatable body about the axis line of the body and is movable relative to the body in said direction parallel to the axis line of the body, and which includes a nozzle-engaging portion which is engageable with one of the suction nozzles;

an engaging-member rotating device which rotates the engaging member to at least two rotation phases of the rotatable body at each of which the nozzle-engaging portion of the engaging member is engageable with said one suction nozzle;

an engaging-member moving device which moves the engaging member in said direction parallel to the axis line of the rotatable body, so that the nozzle-engaging portion of the engaging member engages said one suction nozzle and moves said one suction nozzle toward the board supporting device; and

a control device which controls the main moving device, the rotatable-body rotating device, the engaging-member rotating device, and the engaging-member moving device.

5. A system according to claim 4, wherein the engaging-member rotating device comprises a rotating device which can rotate the engaging member to an arbitrary

rotation phase of the rotatable body about the axis line of the body.

6. A system according to claim 5, wherein the control device comprises:

a positioning control portion which can sequentially position, owing to combination of the rotation of the rotatable body by the rotatable-body rotating device and the movement of the movable member by the main moving device, the respective electric components sucked and held by the suction nozzles, at respective positions opposed to respective predetermined locations on the printed-wiring board supported by the board supporting device, such that each of the electric components thus positioned takes an arbitrary rotation position; and

a mounting control portion which controls the engaging-member rotating device to rotate, concurrently with the rotation of the rotatable body, the engaging member to a rotation phase corresponding to said one of the suction nozzles that holds the electric component to be mounted next, which controls the engaging-member moving device to move, in said direction parallel to the axis line of the rotatable body, the engaging member to engage said one suction nozzle, so that said one suction nozzle is moved toward the board supporting device and the electric component held by said one suction nozzle is mounted on the printed-wiring board.

7. A system according to claim 4, further comprising a plurality of switch valve devices which are supported by the rotatable body, which correspond to the plurality of suction nozzles, respectively, and each of which comprises at least one switch valve including at least one engageable portion, wherein the engaging member includes at least one valve-engaging portion which is engageable with said at least one engageable portion of the switch valve to switch the switch valve, and wherein the engaging-member rotating device rotates the engaging member to move the valve-engaging portion of the engaging member to a position corresponding to the engageable portion of the switch valve of one of the switch valve devices, and the engaging-member moving device moves the engaging member so that the valve-engaging portion of the engaging member engages the engageable portion of the switch valve of said one switch valve device and thereby switches said one switch valve device.

8. An electric-component mounting system, comprising:

a board supporting device which supports a printed-wiring board;

a rotatable body which is rotatable about an axis line thereof perpendicular to the printed-wiring board supported by the board supporting device;

a main moving device which moves at least one of the rotatable body and the board supporting device, relative to the other of the rotatable body and the board supporting device, to an arbitrary position on a movement plane parallel to the printed-wiring board supported by the board supporting device;

a rotatable-body rotating device which rotates the rotatable body about the axis line thereof;

a plurality of suction nozzles which sucks and holds respective electric components and which are supported by the rotatable body such that the suction nozzles are provided along a first circle whose center is located on the axis line of the rotatable body and such that each of the suction nozzles is movable relative to the body in a direction parallel to the axis line of the body;

a nozzle moving device which moves each of the suction nozzles toward, and away from, the board supporting device; and

a control device which controls the main moving device, the rotatable-body rotating device, and the nozzle moving device,

the nozzle moving device comprising

an engaging member which is rotatable relative to the rotatable body about the axis line of the body and is movable relative to the body in said direction parallel to the axis line of the body, and which includes a

nozzle-engaging portion which is engageable with one of the suction nozzles,

an engaging-member rotating device which rotates the engaging member to at least two rotation phases of the rotatable body at each of which the nozzle-engaging portion of the engaging member is engageable with said one suction nozzle, and

an engaging-member moving device which moves the engaging member in said direction parallel to the axis line of the rotatable body, so that the nozzle-engaging portion of the engaging member engages said one suction nozzle and moves said one suction nozzle toward the board supporting device.

9. A system according to claim 8, wherein the engaging-member rotating device comprises a rotating device which can rotate the engaging member to an arbitrary rotation phase of the rotatable body about the axis line of the body.

10. A system according to claim 8, further comprising a plurality of switch valve devices which are supported by the rotatable body, which correspond to the plurality of suction nozzles, respectively, and each of which comprises at least one switch valve including at least one engageable portion, wherein the engaging member includes at least one valve-engaging portion which is engageable with

said at least one engageable portion of the switch valve to switch the switch valve, and wherein the engaging-member rotating device rotates the engaging member to move the valve-engaging portion of the engaging member to a position corresponding to the engageable portion of the switch valve of one of the switch valve devices, and the engaging-member moving device moves the engaging member so that the valve-engaging portion of the engaging member engages the engageable portion of the switch valve of said one switch valve device and thereby switches said one switch valve device.

11. A system according to claim 10, wherein each of the switch valve devices comprises a plurality of switch valves each of which includes said at least one engageable portion, and wherein the valve-engaging portion of the engaging member is selectively engageable, owing to a relative rotation of the engaging member and the rotatable body, with each of the respective engageable portions of the switch valves of said each switch valve device.

12. A system according to claim 11, further comprising an electric-component supplying device which supplies the electric components to the suction nozzles, wherein the switch valves of said each switch valve device comprise a first switch valve and a second switch valve each of which includes said at least one engageable portion,

wherein owing to a movement of the engaging member to engage one of the suction nozzles that corresponds to said each switch valve device and thereby move said one suction nozzle toward the electric-component supplying device, the valve-engaging portion of the engaging member engages the engageable portion of the first switch valve, so that in a terminal portion of the movement of the engaging member, the first switch valve is switched to a state in which the first switch valve permits supplying of a negative pressure to said one suction nozzle, and wherein owing to a movement of the engaging member to engage said one suction nozzle and thereby move said one suction nozzle toward the board supporting device, the valve-engaging portion of the engaging member engages the engageable portion of the second switch valve, so that in a terminal portion of the movement of the engaging member, the second switch valve is switched to a state in which the second switch valve stops the supplying of the negative pressure to said one suction nozzle.

13. A system according to claim 12, wherein said each switch valve device is switched, when the second switch valve thereof is switched to said state to stop the supplying of the negative pressure to said one suction nozzle, to a state in which said each switch valve device permits supplying of a positive pressure to said one suction nozzle.

14. A system according to claim 11, wherein the switch valves of said each switch valve device comprises a first switch valve and a second switch valve each of which comprises a spool valve including a spool, and wherein the respective spools of the respective first switch valves of the switch valve devices are provided along a second circle whose center is located on the axis line of the rotatable body and whose diameter is smaller than a diameter of the first circle along which the suction nozzles are provided, and the respective spools of the respective second switch valves of the switch valve devices are provided along a third circle whose center is located on the axis line of the rotatable body and whose diameter is smaller than the diameter of the first circle and is different from the diameter of the second circle, such that the respective spools of the respective second switch valves are alternate with the respective spools of the respective first switch valves in a zigzag pattern in a circumferential direction of the rotatable body.

15. A system according to claim 10, wherein said at least one switch valve of each of the switch valve devices comprises a spool valve comprising

a spool which extends in a direction having an angle relative to a horizontal plane, and which is movable to an upper position thereof and a lower position thereof to control supplying of a negative pressure to one of the

suction nozzles that corresponds to said each switch valve device; and

a spool-downward-movement preventing device which prevents, at at least the upper position of the spool, a downward movement of the spool because of gravity, and permits a downward movement of the spool by engagement of the spool with the valve-engaging portion of the engaging member.

16. A system according to claim 15, wherein the rotatable body has a plurality of spool holes in which the respective spools of the respective spool valves of the switch valve devices are fitted, respectively, and wherein the spool-downward-movement preventing device of said each switch valve device comprises a pressure-based spool-downward-movement preventing device which applies at least one of a positive pressure and a negative pressure, to a local portion of an outer circumferential surface of a corresponding one of the spools in a circumferential direction of said one spool, and thereby presses said one spool against an inner circumferential surface of a corresponding one of the spool holes, so that said one spool is prevented from moving downward, by a frictional force which is produced between the outer circumferential surface of said one spool and the inner circumferential surface of said one spool hole.

17. A system according to claim 10, wherein the switch valves of said each switch valve device comprises a first switch valve and a second switch valve each of which comprises a spool valve including a spool, and wherein the rotatable body has a negative-pressure passage through which a negative pressure is supplied to one of the suction nozzles that corresponds to said each switch valve device and which communicates with the first and second switch valves in series, and a positive-pressure passage through which a positive pressure is supplied to said one suction nozzle and which communicates with the second switch valve, and wherein in a state in which the first and second switch valves are positioned at respective upper positions thereof, the negative-pressure passage is closed by the first switch valve and is opened by the second switch valve, and the positive-pressure passage is closed by the second switch valve, and, when the spool of the first switch valve is moved to a lower position thereof from said state, the negative-pressure passage is completely opened, and when the spool of the second switch valve is additionally moved to a lower position thereof, the negative-pressure passage is closed and the positive-pressure passage is opened.

18. A system according to claim 17, wherein the positive-pressure passage communicates with the spool hole of the first switch valve, such that the positive-pressure passage is partly interfered with by the

spool of the first switch valve, and a clearance between an outer circumferential surface of the spool of the first switch valve and an inner circumferential surface of the spool hole of the first switch valve communicates with a space whose pressure is lower than the positive pressure supplied through the positive-pressure passage, and wherein the positive-pressure passage communicates with the spool hole of the second switch valve, and a clearance between an outer circumferential surface of the spool of the second switch valve and an inner circumferential surface of the spool hole of the second switch valve communicates with a space whose pressure is lower than the positive pressure supplied through the positive-pressure passage.

19. A system according to claim 15, wherein the spool-downward-movement preventing device comprises a friction ring which is supported by the rotatable body such that the friction ring is not movable relative to the rotatable body and is interference-fitted on the spool, and which prevents the downward movement of the spool, owing to a frictional force which is produced between the spool and the friction ring.

20. A system according to claim 12, wherein the first and second switch valves include, in addition to respective first engageable portions as the respective engageable portions thereof which are engageable with the

valve-engaging portion of the engaging member, respective second engageable portions, and wherein the system further comprises a returning device which is simultaneously engageable with the second engageable portions of the first and second switch valves, to simultaneously return the first and second switch valves to respective initial states thereof in which the first and second switches cooperate with each other to stop the supplying of the negative pressure, and the supplying of the positive pressure, to said one suction nozzle.

21. An electric-component mounting system, comprising:

a board supporting device which supports a printed-wiring board;

a movable member which is movable to an arbitrary position on a movement plane parallel to the printed-wiring board supported by the board supporting device;

a main moving device which moves the movable member;

a rotatable body which is attached to the movable member such that the rotatable body is rotatable about an axis line thereof perpendicular to the movement plane;

a rotatable-body rotating device which rotates the rotatable body about the axis line thereof;

a plurality of suction nozzles which sucks and holds respective electric components and which are supported

by the rotatable body at respective positions offset from the axis line of the rotatable body;

a nozzle moving device which moves at least one of (a) each of the suction nozzles and (b) the board supporting device, toward, and away from, the other of said each suction nozzle and the board supporting device, in a direction perpendicular to the movement plane;

an image taking device which simultaneously takes, during a movement of the rotatable body caused by the movement of the movable member by the main moving device, respective images of the electric components held by the suction nozzles, while the image taking device is moved with the rotatable body; and

a control device which obtains information by processing the images of the electric components taken by the image taking device, and controls, based on the obtained information, at least one of the main moving device, the rotatable-body rotating device, and the nozzle moving device.

22. A system according to claim 21, wherein the main moving device comprises a slide which is movable in an X-axis direction parallel to the movement plane, and moves, on the slide, the movable member in a Y-axis direction parallel to the movement plane and perpendicular to the X-axis direction, wherein the image taking device is attached with the rotatable body to the movable member, and

wherein the system further comprises a reflecting device which is supported by the slide such that the reflecting device is opposed to a path of movement of the rotatable body and the image taking device, and which causes the respective images of the electric components held by the suction nozzles, to be incident to the image taking device.

23. A system according to claim 21, wherein the control device comprises an error-elimination control portion which determines, based on the information obtained by processing the images of the electric components taken by the image taking device, at least one position error of the electric component held by each of the suction nozzles, and controls at least one of the main moving device and the rotatable-body rotating device to eliminate the determined position error, and thereby eliminate at least one position error of the electric component relative the printed-wiring board on which the electric component is to be mounted.